CLAIMS

1. Power system stabiliser comprising a rotating electrical main machine (2, 2') with power line terminals, a current converter (18, 18') and a voltage source, **characterised in that**

windings (14) in a stator (12) in the electrical main machine (2, 2') are connected to the electric power network terminals;

a rotor (10) in the electrical main machine (2, 2') comprises alternating current windings (16);

one of the terminals of the current converter (18, 18') is connected to the alternating current windings (16) of the rotor;

the other terminal of the current converter (18, 18') is connected to the voltage source;

whereby electric power is exchanged via the power line terminals by changing the rotational speed of the rotor (10).

2. Power system stabiliser according to claim 1, **characterised in that** the voltage source is a voltage source, which is independent of the power lines.

3. Power system stabiliser according to claim 1 or 2, **characterised in that** the voltage source is a regulating machine (20, 20').

4. Power system stabiliser according to claim 1, 2 or 3, **characterised in that** the regulating machine (20, 20') and the main machine (2, 2') has a common shaft (22).

5. Power system stabiliser according to claim 4, **characterised in that** the current converter (18') is arranged at the static parts of the main machine and connected to the rotor windings (16) of the main machine via brushes (30) and slip rings (32).

6. Power system stabiliser according to claim 5, **characterised by** a control system, which comprises a first control unit (48) for control of the static current converter (18').

7. Power system stabiliser according to claim 6, **characterised in that** the control system comprises a second control unit (46), which is arranged co-rotating with the common shaft (22).

8. Power system stabiliser according to claim 6 or 7, **characterised in that** the first control unit (48) is arranged for control of the voltage source.

9. Power system stabiliser according to claim 4, **characterised in that** the regulation machine (20) and the main machine (2) are brushless and in that the current converter (18) is arranged co-rotating at the shaft (22) of the rotor.

10. Power system stabiliser according to claim 9, **characterised by** a control system, which comprises a first control unit (46) for control of the current converter (18), which first control unit (46) is arranged co-rotating at the shaft (22) of the rotor.

11. Power system stabiliser according to claim 10, **characterised in that** the control system comprises a second control unit (48), which is arranged for control of the voltage source.

12. Power system stabiliser according to claim 8 or 11, **characterised in that** the control system (46, 48) comprises an electric power network sensor (50; 51) for sensing of an electric disturbance in the electric power network.

13. Power system stabiliser according to claim 12, **characterised in that** the electric disturbance is a disturbance of at least one quantity selected from the group of:

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the amplitude of the voltage;
the virtual value of the voltage;
the phase of the voltage;
the frequency of the voltage;
the amplitude of the current;
the virtual value of the current;
the phase of the current; and
the frequency of the current.

14. Power system stabiliser according to claim 12 or 13, **characterised in that** the control system comprises a first temperature sensor (64) for sensing of the stator temperature.

15. Power system stabiliser according to claim 14, **characterised in that** the control system comprises a second temperature sensor (60) for sensing of the rotor temperature, which second temperature sensor (60) being connected to the co-rotating control unit (46).

16. Power system stabiliser according to claim 14 or 15, **characterised in that** the control system comprises communication means (54, 56) for wireless communication between the control units (46, 48).

17. Power system stabiliser according to any of the claims 12 to 16, **characterised by** a transformer (3) arranged between the stator winding (14) and the power line terminals.

18. Power system stabiliser according to claim 17, **characterised in that** the electric power network sensor (50) of the control system is arranged for sensing of voltage and/or current in the terminal between the transformer (3) and the stator winding (14).

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19. Power system stabiliser according to any of the claims 1 to 18, **characterised by** a flywheel arranged at the shaft (22) of the electrical main machine.

20. Power system stabiliser according to any of the claims 1 to 19, **characterised by** a driving means arranged for applying a force to the shaft (22) of the electrical main machine.

21. Power system stabiliser according to claim 20, **characterised in that** the driving means is a turbine.

22. Power system stabiliser according to claim 20, **characterised in that** the driving means is a combustion engine.

23. Power system stabiliser according to any of the claims 1 to 22, **characterised by** a load means arranged for collecting of the driving force of the shaft (22) of the electrical main machine.

24. Power system stabiliser according to claim 23, **characterised in that** the load means is a brake (70).

25. Power system stabiliser according to claim 23, **characterised in that** the load means is an electrical generator.

26. Power system stabiliser according to any of the claims 1 to 25, **characterised in that** the rotor winding (16) is arranged for having a current displacement, which is dependent on the frequency of the rotor current.

27. Power network comprising power lines and a shunt stabiliser (84, 84A, 84B), which shunt stabiliser comprises a rotating electrical main machine (2, 2') connected to the power lines, a current converter (18, 18') and a voltage source, **characterised in that**

windings (14) in a stator (12) in the electrical main machine (2, 2') are connected to the power lines;

a rotor (10) in the electrical main machine (2, 2') comprises alternating current windings (16);

one of the terminals of the current converter (18, 18') is connected to the alternating current windings (16) of the rotor;

the other terminal of the current converter (18, 18') is connected to the voltage source;

whereby electric power is exchanged between the power lines and the shunt stabiliser (84, 84A, 84B) by changing the rotational speed of the rotor (10).

28. Power network according to claim 27, **characterised in that** the voltage source is a voltage source, which is independent of the power lines.

29. Power network according to claim 27 or 28, **characterised in that** the voltage source is a regulating machine (20, 20').

30. Power network according to claim 27, 28 or 29, **characterised in that** the regulating machine (20, 20') and the main machine (2, 2') has a common shaft (22).

31. Power network according to claim 30, **characterised in that** the current converter (18') is arranged at the static parts of the main machine and connected to the rotor windings (16) of the main machine via brushes (30) and slip rings (32).

32. Power network according to claim 31, **characterised by** a control system, which comprises a first control unit (48) for control of the static current converter (18').

33. Power network according to claim 32, **characterised in that** the control system comprises a second control unit (46), which is arranged co-rotating with the common rotor (22).

34. Power network according to claim 32 or 33, **characterised in that** the first control unit (48) is arranged for control of the voltage source.

35. Power network according to claim 30, **characterised in that** the regulation machine (20) and the main machine (2) are brushless and in that the current converter (18) is arranged co-rotating at the shaft (22) of the rotor.

36. Power network according to claim 35, **characterised by** a control system, which comprises a first control unit (46) for control of the current converter (18), which first control unit (46) is arranged co-rotating at the shaft (22) of the rotor.

37. Power network according to claim 36, **characterised in that** the control system comprises a second control unit (48), which is arranged for control of the voltage source.

38. Power network according to claim 34 or 37, **characterised in that** the control system (46, 48) for control of the voltage source and the current converter comprises an electric power network sensor (50; 51) for sensing of an electric disturbance in the electric power network.

39. Power network according to claim 38, **characterised in that** the electric disturbance is a disturbance of at least one quantity selected from the group of:

the amplitude of the voltage;
the virtual value of the voltage;
the phase of the voltage;

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the frequency of the voltage;
the amplitude of the current;
the virtual value of the current;
the phase of the current; and
the frequency of the current.

40. Power network according to claim 39, **characterised in that** the control system comprises a first temperature sensor (64) for sensing of the stator temperature.

41. Power network according to claim 40, **characterised in that** the control system comprises a second temperature sensor (60) for sensing of the rotor temperature, which second temperature sensor (60) being connected to the co-rotating control unit (46).

42. Power network according to claim 40 or 41, **characterised in that** the control system comprises communication means (54, 56) for wireless communication between the control units (46, 48).

43. Power network according to any of the claims 38 to 42, **characterised by** a transformer (3) arranged between the stator winding (14) and the power lines.

44. Power network according to claim 43, **characterised in that** the electric power network sensor (50) is arranged for sensing of the voltage in the terminal between the transformer (3) and the stator winding (14).

45. Power network according to any of the claims 27 to 44, **characterised by** a flywheel arranged at the shaft (22) of the electrical main machine.

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46. Power network according to any of the claims 27 to 45, **characterised by** a driving means arranged for applying a force to the shaft (22) of the electrical main machine.

47. Power network according to claim 46, **characterised in that** the driving means is a turbine.

48. Power network according to claim 46, **characterised in that** the driving means is a combustion engine.

49. Power network according to any of the claims 27 to 48, **characterised by** a load means arranged for collecting of the driving force of the shaft of the electrical main machine.

50. Power network according to claim 49, **characterised in that** the load means is a brake (70).

51. Power network according to claim 49, **characterised in that** the load means is an electrical generator.

52. Power network according to any of the claims 27 to 51, **characterised in that** the rotor winding (16) is arranged for having a current displacement, which is dependent on the frequency of the rotor current.

53. Method for stabilising of the voltage in a power system comprising the step of:

transmitting of electric power between a power line and a rotating electrical main machine (2, 2'),

characterised by the step of:

regulating the, by the electrical main machine (2, 2') emitted/received, electric power by changing of the rotational speed of the electrical main machine.

54. Method according to claim 53, **characterised in that** the step of regulation comprises the steps of:

providing of a rotor current through rotor windings (16) at the electrical main machine (2, 2');

controlling of amplitude, phase and frequency of the rotor voltage for achieving of required amplitude, phase and frequency of the voltage over stator windings (14) at the electrical main machine (2, 2').

55. Method according to claim 54, **characterised in that** the regulation power of the rotor winding of the main machine is provided by a regulation machine (20, 20').

56. Method according to claim 55, **characterised in that** a shaft of the regulation machine (20, 20') is mechanically driven by a shaft (22) of the electrical main machine (2, 2').

57. Method according to any of the claims 53 to 56, **characterised by** the step of:

sensing of current/voltage of the power line for detecting of disturbances in its amplitude, virtual value, phase or frequency;

whereby the regulation takes place based on at least one of the detected disturbances.

58. Method according to claim 57, **characterised by** the step of:

sensing of the temperature of the stator windings (14) of the main machine;

whereby the regulation takes place based also on the stator temperature.

59. Method according to claim 57 or 58, **characterised by** the step of:

sensing of the temperature of the rotor windings (16) of the main machine;

whereby the regulation takes place based also on the rotor temperature.

60. Method according to claim 59, **characterised in that** the regulation step during a limited time gives electric powers that exceed rated power, valid for continuous operation, for the electrical main machine (2, 2').

61. Method according to any of the claims 53 to 60, **characterised by** the step of:

transferring of control information between the stationary and rotating parts of the main machine.

62. Method according to any of the claims 53 to 61, **characterised by** the step of:

transforming the voltage over the stator windings (14) of the main machine to a suitable network voltage.
